



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,144	04/21/2004	Anthony M. Mazany	GRCBP0317USA	5093
53428 7590 02/26/2008 DON W. BULSON (GRCO) RENNER, OTTO, BOISSELLE & SKLAR, LLP 1621 EUCLID AVENUE 19TH FLOOR CLEVELAND, OH 44115				
EXAMINER LAFOND, RONALD D				
ART UNIT 1792		PAPER NUMBER		
MAIL DATE 02/26/2008		DELIVERY MODE PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/829,144

## Applicant(s)

MAZANY ET AL.

## Examiner

RONALD D. LAFOND

## Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.  
4a) Of the above claim(s) 28-56 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-27 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 21 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-850)  
Paper No(s)/Mail Date 5/13/04, 8/8/05, 10/3/05  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☒ Other: IDS 1/12/06, 1/22/08

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1 – 27, drawn to a method of coating, classified in class 427, subclass 383.1.
- II. Claims 28 – 54, drawn to a coating composition, classified in class 106, subclass 14.05.
- III. Claims 55 and 56, drawn to a carbon-carbon composite treated with a coating

composition, classified in class 428, subclass 471.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case, the product as claimed can be used in a materially different process, e.g. treating a material that is a carbon-iron composite.

3. Inventions I and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process, e.g. using a different oxidation-inhibiting composition that comprises organometallic complexes of aluminum and the at least one additional metal, instead of aluminum and metal salts.

4. Inventions II and III are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product, and the species are patentably distinct (MPEP § 806.05(j)). In the instant case, the intermediate product is deemed to be useful as a composition for coating other types of composites, e.g. carbon-iron composites, and the inventions are deemed patentably distinct because there is nothing of record to show them to be obvious variants.

Art Unit: 1792

5. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

**Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.**

6. The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of

Art Unit: 1792

the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

7. During a telephone conversation with Neil DuChez on January 18, 2008, a provisional election was made without traverse to prosecute the invention of Group I, Claims 1 – 27. Affirmation of this election must be made by applicant in replying to this Office action. Claims 28 – 56 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

8. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1 – 7, 14 – 23, 25, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Stover (United States Patent 5,759,622).

11. Regarding Claim 1, Stover teaches a method of inhibiting oxidation of a porous carbon-carbon composite (see Column 13, lines 37 – 40) comprising the steps of: (a) contacting the carbon-carbon composite with an oxidation inhibiting composition (see Column 13, lines 38 – 40) comprising phosphoric acid, at least one aluminum salt, and at least one additional metal salt (zinc salt; see Column 13, lines 42 – 44), the oxidation inhibiting composition penetrating at least some of the pores of the carbon-carbon composite (see Column 13, lines 40, 41, 45, and 46); and (b) heating the carbon-carbon composite at a

Art Unit: 1792

temperature sufficient to form a deposit from the oxidation inhibiting composition within at least some of the penetrated pores of the carbon-carbon composite (see Column 13, lines 44 – 47).

12. Regarding Claims 2 and 26, Stover teaches the method wherein the metal to phosphate atomic ratio for the oxidation inhibiting composition is adjusted to be about 0.35 by adding a metal salt to the oxidation inhibiting composition (see Example 3 in Column 7, lines 15 – 20. This example mandates 20 parts of an 85% solution of phosphoric acid, 48 parts of a 50% solution of monoaluminum phosphate,  $\text{Al}(\text{H}_2\text{PO}_4)_3$  (see Column 4, lines 4 and 5), 12 parts of zinc phosphate dehydrate,  $\text{Zn}_3(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ , and 20 parts water. Because all parts are by weight, this corresponds to 17 parts phosphate from phosphoric acid, 24 parts of  $\text{Al}(\text{H}_2\text{PO}_4)_3$ , and 12 parts of  $\text{Zn}_3(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ , which further corresponds to 0.173 mol of phosphate from phosphoric acid, 0.075 mol  $\text{Al}(\text{H}_2\text{PO}_4)_3$ , and 0.028 mol  $\text{Zn}_3(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ . This finally corresponds to 0.454 mol of phosphate (0.173 mol from phosphoric acid, 0.225 mol from  $\text{Al}(\text{H}_2\text{PO}_4)_3$ , and 0.056 mol from  $\text{Zn}_3(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ ) and 0.159 mol of metal (0.075 mol of Al and 0.084 mol of Zn), for a ratio of about 0.35).

13. Regarding Claim 3, Stover teaches the method wherein the weight ratio of the additional metal to aluminum is about 2.7 to 1 (see citations and calculations for Claim 2; 0.075 mol Al and 0.084 mol Zn corresponds to 2.03 g Al and 5.49 g Zn, for the weight ratio of about 2.7 to 1).

14. Regarding Claim 4, Stover teaches the method wherein the oxidation inhibiting composition further comprises water (see again Column 7, lines 15 – 20).

15. Regarding Claims 5 – 7, Stover teaches the method wherein the additional metal salt comprises a salt of a transition metal and wherein the cation of the additional metal salt is multivalent zinc (see previous citations).

16. Regarding Claims 14 and 15, Stover teaches the method wherein the aluminum salt comprises mono-aluminum phosphate (see previous citations).

17. Regarding Claims 16 and 17, Stover teaches the method wherein the oxidation inhibiting composition further comprises a wetting agent that comprises a polysiloxane (see Column 4, lines 9 – 62; Column 7, lines 53 – 56; and Column 13, lines 37 – 43 and line 63).

Art Unit: 1792

18. Regarding Claim 18, Stover teaches the method wherein the oxidation that is inhibited is a catalyzed oxidation (see again Column 1, lines 37 and 38).
19. Regarding Claim 19, Stover teaches the method wherein the composite is heated during step (b) at a temperature in the range of about 640 to about 900 C (see Column 13, lines 48 – 51).
20. Regarding Claims 20 – 22, Stover teaches the method wherein a barrier coating is applied to at least one surface of the carbon-carbon composite prior to step (a), and wherein the barrier coating comprises silicon carbide (see Column 14, lines 1 – 4).
21. Regarding Claim 23, Stover teaches the method wherein the barrier coating is applied to the carbon-carbon composite using chemical vapor deposition (see Column 14, lines 5 and 6).
22. Regarding Claim 25, Stover teaches the method wherein the depth of penetration of the oxidation inhibiting composition into the pores of the carbon-carbon composite is about 4 mm (see Column 12, lines 20 – 22).

***Claim Rejections - 35 USC § 103***

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stover.
25. Regarding this Claim, Stover does not explicitly teach the method wherein the metal to phosphate atomic ratio for the oxidation inhibiting composition is adjusted to be in the range of about 0.26 to about 0.50 by adding a metal nitrate or a metal halide to the oxidation inhibiting composition. However, as discussed for Claims 2 and 26 above, Stover does teach the analogous method wherein the metal salt is a metal phosphate. Furthermore, Stover teaches, in Column 13, lines 53 – 55, that "the zinc salt is selected from the group consisting of a zinc halide, a zinc nitrate, a zinc phosphate, and a mixture thereof." Note that by replacing zinc phosphate dihydrate with a zinc halide or zinc nitrate, assuming a

Art Unit: 1792

desire to have the same amount of zinc by mol in the composition, the elimination of the phosphate from the zinc salt still results in an atomic ratio of metal to phosphate of approximately 0.4, within the range of about 0.26 to about 0.50. It has been held that, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art", a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Alternatively, if the 12 parts by weight of zinc phosphate dehydrate were instead replaced with 12 parts by weight of zinc nitrate, the metal to phosphate atomic ratio would be 0.35, still rendering the claimed range *prima facie* obvious. Moreover, it has been held that, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Stover in Examples 3 and 9 by utilizing a zinc salt that is a zinc halide or a zinc nitrate as also taught by Stover to have achieved the same or a similar metal to phosphate atomic ratio as taught in Examples 3 and 9 of Stover, because Stover teaches that the zinc salt employed may be either a zinc nitrate, a zinc halide, or a zinc phosphate, and because Stover teaches the general conditions of such a method.

26. Claims 8 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stover in view of Block (United States Patent 4,454,193).

27. Regarding Claims 8, 11, and 12, Stover does not teach the method wherein the additional metal salt comprises an alkaline earth metal salt which comprises magnesium nitrate. Block teaches, in Column 9, lines 21 – 36, "a method for inhibiting the oxidation of a carbon body which comprises: (a) impregnating a porous carbon body with a solution of a metal salt ... (b) curing said impregnated carbon body ... and (c) calcining said cured carbon body ... wherein said cured carbon body is calcined at a temperature of from about 700 to about 950 C." Furthermore, Block teaches, in Column 5, lines 56 – 61, that "zinc and magnesium salts provide carbon composites that are especially resistant to oxidation at elevated temperatures. Thus, zinc and magnesium are even more preferred multi-valent cations. The most preferred salts for preparing the carbon composites of this invention are the magnesium salts." Finally,



Art Unit: 1792

Block also teaches, in Column 6, lines 3 – 6, that magnesium nitrate is a preferred such salt. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Stover by employing an additional metal salt that comprises magnesium nitrate in place of the zinc salt taught by Stover with a reasonable expectation of success, because Block teaches that zinc and magnesium salts are especially resistant to oxidation at elevated temperatures.

28. Regarding Claims 9 and 10, Stover in view of Block does not teach the method wherein the additional metal salt comprises magnesium phosphate. However, as discussed above, Stover teaches the method wherein the additional metal salt is zinc phosphate dihydrate, and Block teaches that zinc and magnesium salts provide carbon composites that are especially resistant to oxidation at elevated temperatures. Furthermore, Stover teaches, in Column 3, lines 58 – 61, that the zinc salt may be any zinc salt capable of forming zinc phosphate upon heating. Examples of zinc salts include zinc halides, ... zinc nitrate, zinc phosphate, and mixtures thereof." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Stover in view of Block by employing an additional metal salt that is a magnesium phosphate with a reasonable expectation of success, because Stover teaches that metal salts that are zinc nitrates, zinc halides, and/or zinc phosphates are known, and because Block teaches that zinc and magnesium salts both provide carbon composites that are especially resistant to oxidation at elevated temperatures.

29. Regarding Claim 13, Stover in view of Block does not explicitly teach the method wherein the additional metal salt comprises (i) magnesium phosphate, and (ii) a magnesium nitrate. However, as discussed, Stover in view of Block teaches that the additional metal salt may be a magnesium nitrate or a magnesium phosphate. Further, as discussed, Stover explicitly teaches that the "zinc salt may be any zinc salt capable of forming zinc phosphate upon heating. Examples of zinc salts include ... zinc nitrate, zinc phosphate, and mixtures thereof." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Stover in view of Block by employing an additional metal salt that comprises a combination of magnesium phosphate and magnesium nitrate with a reasonable expectation of success, because Stover teaches that combinations of different salts of the additional metal compound may successfully be used in such methods.

Art Unit: 1792

30. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stover in view of Galasso, et al. (United States Patent 4,425,407, hereafter Galasso).

31. Regarding this Claim, Stover does not teach the method wherein the barrier coating is formed by reacting the carbon-carbon composite with molten silicon. Galasso teaches, in Column 2, lines 56 – 64, that "carbon-carbon composites may be protected from oxidation by converting the surface of the material to an oxidation resistant material. One commonly used family of coating processes utilizes silicon to convert the surface of carbon-base materials to silicon carbide. For example, the carbon-carbon composite material may be dipped in or otherwise contacted with molten silicon or exposed to silicon vapor to cause the surface of the material to converted to silicon carbide." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Stover by forming the silicon carbide barrier coating by reacting the carbon-carbon composite with molten silicon as taught by Galasso, because Galasso teaches that such a method of forming a silicon carbide coating on a carbon-carbon composite is well known in the art.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONALD D. LAFOND whose telephone number is (571) 270-1878. The examiner can normally be reached on M - F, 9:30 AM - 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. D. L./

Examiner, Art Unit 1792

/Michael Cleveland/

Supervisory Patent Examiner, Art Unit 1792